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10/646,073	08/22/2003	David R. Shafer	KLAC0076	8450

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/646,073
Filing Date: August 22, 2003
Appellant(s): SHAFER ET AL.

Steven Smyrski
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed July 30, 2007 appealing from the Office action mailed January 26, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 2001/0040722	SHAFER	11-2001
US 4,108,794	YONEKUBO	8-1978
WO 01/57563	DEUTSCH	8-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 43-51, 53-74, 76-86 and 88-99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shafer (US 2001/0040722) in view of Yonekubo (US 4,108,794).

Regarding claims 43, 46, 50-51, 53-55, 57, 59, 63, 65, 69, 73, 74, 76-78, 81, 85-86, 88-90, 92, 94 and 98, Shafer teaches an objective (fig. 3) constructed of a single glass material (page 6, section [0082]) for use with light energy having a wavelength in the range of approximately 157 nanometers through the infrared light range (page 6, section [0082]), comprising: at least one focusing lens (308) having diameter less than approximately 100 millimeters (fig. 3) receiving said light energy and transmitting focused light energy; at least one field lens (304 or 307) having diameter less than approximately 100 millimeters (fig. 3), receiving said focused light energy and transmitting intermediate light energy; and at least one Mangin mirror element (306), which is an optical element, having diameter less than 100 millimeters (fig. 3) receiving said intermediate light energy and providing controlled light energy to a specimen (309, not shown); wherein each focusing lens and each field lens is formed from a single glass material and aligned substantially along an axis, and further wherein the Mangin mirror element, the at lest one focusing lens, and the at least one field lens are configured to balance aberrations therebetween, the aberration balancing reducing decenter sensitivity of the Mangin mirror element, the at lest one focusing lens and the at least one field lens (para. 0096), wherein the objective is optimized to produce minimum spherical aberration, axial color, and chromatic variation of aberrations

(page 7, sections [0083]-[0085]); wherein the at least one Mangin mirror element is optimized to produce spherical, axial color, and chromatic variation of aberrations to compensate for aberrations induced by the focusing lens group (page 6, section [0081]); wherein each lens used in the objective has a diameter of less than approximately 25 millimeters (fig. 3); wherein said objective is configured to provide broadband imaging while receiving light energy at wavelengths less than 400 nm (see at least the abstract); and wherein said at least one Mangin mirror element (306) comprises a single lens/mirror element comprising substantially curved concave surface (top surface in figure); and a second minimally curved surface (bottom surface in figure). Shafer states "the arrangement of Fig. 7 allow for improved design performance and relaxes manufacturing tolerances...decentering of any lens by 5 microns will cause less than one quarter wave of coma without any compensating elements." Examiner takes "the arrangement" to be the same as "configured" and Shafer states "the arrangement" is used to reduce the error caused by decentering. Shafer lacks the controlled light energy going through an immersion substance to the specimen and wherein both surfaces of the single lens/mirror element are reflective with small central apertures through which light energy may pass. Yonekubo teaches using an immersion substance, including water and oil, to obtain better imaging performance (columns 1-2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a well known immersion substance with the objective of Shafer as taught by Yonekubo to provide better imaging performance because of reduced reflections due to the index matching provided by the immersion substance.

Regarding claims 49, 61-62, 72, 84 and 96-97, Shafer teaches in fig. 9 an objective for use with light energy having a wavelength in the range of approximately 157 nanometers through

the infrared light range with field and focusing lenses and a Mangin mirror element less than approximately 100 millimeters (fig. 9) wherein only two glass materials are used (see table 5) comprising fused silica and calcium fluoride (see table 5). Shafer lacks the controlled light energy going through an immersion substance to the specimen and said Mangin mirror element receiving said intermediate light energy through a back/rear side thereof. Immersion substances, including water and oil are well known in the microscope/lithography art to obtain better imaging performance. Yonekubo teaches using an immersion substance, including water and oil, to obtain better imaging performance (columns 1-2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a well known immersion substance with the objective of Shafer as taught by Yonekubo to provide better imaging performance.

Regarding claims 58 and 93, Shafer teaches said objective (fig. 3) having a numerical aperture of greater than approximately 1.0 at the specimen (page 7, section [0085]).

Regarding claims 44-45, 56, 66-68, 64, 79-80, 91 and 99, Shafer in view of Yonekubo as set forth above disclose the claimed invention except for wherein said objective has a field size of approximately 0.15 mm and a numerical aperture of approximately 1.2. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make objective have a field size of approximately 0.15 mm and a numerical aperture of approximately 1.2, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to have the objective have a field size of approximately 0.15 mm and a numerical aperture of approximately 1.2 for the purpose of providing a larger field of view. *In re Antonie*, 559 F.2d

618, 195 USPQ 6 (CCPA 1977) See also *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claims 47-48, 60, 70, 71, 82, 83 and 95, Shafer in view of Yonekubo as set forth above further disclose said objective having a long working distance used with a microscope (Shafer, figs. 1 and 2) having a flange (at 102 or 202) but is silent as to the location of the flange being approximately 45 millimeters from the specimen during normal operation or at least approximately 100 millimeters from the specimen during normal operation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the flange be approximately 45 millimeters from the specimen during normal operation or at least approximately 100 millimeters from the specimen during normal operation, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to have the flange be approximately 45 millimeters from the specimen during normal operation or at least approximately 100 millimeters from the specimen during normal operation for the purpose of having an appropriate working area for interacting with/changing the specimen. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) See also *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 52, 75 and 87 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shafer et al. in view of Yonekubo as applied to claims 43, 66 and 78 above and further in view Deutsch et al., WO 01/57563 A2.

Shafer in view of Yonekubo as applied to claims 43 and 78 above disclose the claimed invention except for the immersion substance being a silicone gel. Deutsch teaches using a silicone gel as an immersion substance (page 2, lines 18-20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the immersion substance of Shafer in combination with Yonekubo be a silicone gel as suggested by Deutsch et al. to provide more controllable flow characteristics to the immersion substance

(10) Response to Argument

Applicant argues the Shafer reference fails to teach balancing aberrations to reduce decenter sensitivity. The prior art teaches all the claimed structural limitations and therefore would be capable of performing all the claimed functional limitations. Further, the Shafer reference teaches reducing chromatic aberration (para. 0083-0085) and increasing the tolerance of decentered elements (para. 0096). Increasing the tolerance is the same as reducing the sensitivity.

Applicant argues balancing of the aberration between the Mangin elements, the field lenses or the focusing lenses is not shown by the Shafer reference. The examiner interprets reducing the chromatic aberration of the system (para. 0083-0085) as being the same as balancing the aberrations of each individual element.

Applicant argues Shafer does not teach elements along a single axis. The examiner agrees Fig. 3 of Shafer does not teach the elements along a single axis. However, Shafer states a "second design approach uses a reflective lens mirror element that has its optical axis mostly

coincident with the optical axis of the major refraction components." (para. 0035). The examiner interprets this statement to mean the Mangin mirror (the only off axis element in Fig. 3) may be placed on the optical axis. Further the claim language states the elements are "aligned substantially along an axis." Therefore the elements do not have to have exactly the same optical axis.

Applicant argues the images received from a combination of the Shafer prior art and an immersion substance would be less than optimal unless extensive experimentation occurred. The need for experimentation is does not rebut a prima facie case of obviousness. If the experimentation is within the skill of one of ordinary skill in the art then the experimentation is routine and would not overcome the rejection. Further the examiner believes the only complication by adding the immersion substance would be the focal point of the system may be changed based on the refractive index of the immersion substance. This problem is easily corrected by adjusting the location of the sample to correspond to the new focal point.

Applicant argues there is not reasoning to support the combination in the rejection other than hindsight reasoning. The use of an immersion substance is extremely well known in the art to reduce reflections at the air/sample and air/objective interfaces.

Applicant argues Shafer fails to teach the use of an immersion substance. The Yonekubo reference is used to teach the claim limitations relating to the immersion substance.

Applicant argues one could not simply place an immersion substance within the Shafer design and obtain an objective design having beneficial aspects presently claimed. The applicant provides no reasoning to support this assertion. As stated above routine experimentation is

within the skill of one of ordinary skill in the art and is not a rebuttal for a prima facie case of obviousness.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Joshua L Pritchett

Conferees:

Stephone B Allen

Darren Schuberg